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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/158,099	09/22/1998	KENJI MIWA	0163-0707-2X	3529
22850	7590	12/21/2004	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			LIN, KUANG Y	
			ART UNIT	PAPER NUMBER
			1725	

DATE MAILED: 12/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

SLT

Office Action Summary

Application No.

09/158,099

Applicant(s)

MIWA ET AL.

Examiner

Kuang Y. Lin

Art Unit

1725

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED-STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15, 18, 20 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15, 18, 20 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

1. The specification is objected to in that in page 13, the lines below table 1 and 2, respectively, it refers to claims 4-5 and claim 6-10. However, those claims were canceled. Correction is required.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 15, 18, 19 and 21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support in the specification for the claimed features of (1) shifting the small pieces to a periphery of a cylindrical tube or container by alternating a magnetic field using an electromagnetic coil (claim 15); alternating a stationary magnetic field using the electromagnetic coil (claim 20); and (3) shifting the small pieces to an end portion of the metallic material in the cylindrical tube or container (claim 21).

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

Art Unit: 1725

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 15, 18, 20 and 21 without considering the new matter are rejected under 35 U.S.C. 103(a) as being unpatentable over Vives

Vives discloses a grain refinement method for aluminum alloy (page 448, left col., last paragraph and right col., 4th complete paragraph) by applying an electric current and a magnetic field simultaneously (page 446, right col., 3rd complete paragraph and the junction paragraph between pages 447 and 448) to the molten aluminum alloy during a solidification process at temperature lower than a liquidus of the alloy (page 446, right col., last paragraph, page 447, right col., second complete paragraph and page 449, right col., 1st complete paragraph). Although he does not mention the feature of shifting a refined material to a periphery of a container to yield the refined material concentrated in an end portion of the metallic material, apparently, his process will produce the same result as that of applicants since he performs the identical process steps as that of applicants. In short, Vives substantially shows the invention as claimed except that he does not show the container is in cylindrical shape. However, it would

have been obvious to use the container of any configuration in the process of Vives depending on the designated metallic casting article to be obtained.

7. Claims 15, 18, 20 and 21 without considering the new matter are rejected under 35 U.S.C. 103(a) as being unpatentable over Radjai et al and further in view of Vives.

Radjai et al substantially show the invention as claimed except they does not disclose to crush solid crystals into small pieces during a solidification process at temperatures lower than the liquidus. However, Vives discloses two distinct causes of grain refinement, represented by fluid flow and cavitation phenomena, in a solidifying liquid metal (see page 448, right col. last paragraph). In the absence of cavitation and for a sufficient intensity of the oscillating flow, the columnar-dendritic crystallization is replaced by a microstructure characterized by the formation of agglomeration of globular particles. On the other hand, when an alloy is solidified in the presence of well-developed cavitation situations, a very fine and homogeneous microstructure has been observed throughout ingot (see page 449, right col. second paragraph and page 454, left col. second paragraph). He also discloses that gas content in the liquid metal (see page 449, left col. second paragraph) and the intensity of magnetic pressure contributed to the cavitation phenomena (see page 449, left col. last paragraph through page 449, right col. last paragraph). It would have been obvious to manipulate the gas content of aluminum alloy and the magnetic pressure during the solidification process of Radjai et al in view of Vives such that to obtain well-developed cavitation situations in the molten metal at the temperature lower than the

liquidus and thereby to better refine the grain structure. It would have been obvious to use the container of any configuration in the process of Vives depending on the designated metallic casting article to be obtained.

8. Applicant's arguments filed October 13, 2004 have been fully considered but they are not persuasive.

a. In page 5 of the remarks applicant stated that Vives does not teach or suggest "shifting the small pieces to a periphery of a cylindrical tube or container by alternating a magnetic field using an electromagnetic coil disposed such that the electromagnetic coil envelops the metallic material to yield the refined microstructure of the metallic material concentrated in the periphery of the cylindrical tube or container" as claimed in claim 15. However, it is noted that Vives discloses a grain refinement method for aluminum alloy by applying an electric current and a magnetic field simultaneously to the molten aluminum alloy during a solidification process at temperature lower than a liquidus of the alloy.

The process is identical to that of as claimed in claim 15. Thus, it is expected that the cast structure of Vives will be the same as that of instant process. Although he does not mention the feature of shifting a refined material to a periphery of a container to yield the refined material concentrated in an end portion of the metallic material, apparently, his process will produce the same result as that of applicants since he performs the identical process steps as that of applicants, i.e. if there is a function of alternating a magnetic field using an electromagnetic coil in applicant's process, it will have a same function in the

process of Vives. Without showing any evidence that the small pieces of Vives are not shifted to a periphery of a container to yield said refined microstructure of the metallic material concentrated in the periphery of the container, the claimed process is deemed to be unpatentable over the teaching of Vives. Apparently, in the initial stage of Vives' process the small pieces are shifted to the periphery of the container as in the instant process. As the process progressing, the periphery of the container is saturated with the small pieces and the small pieces generated at the later stage is accumulated at the region beneath the periphery of the container, and finally the entire ingot is full of small pieces and become a homogeneous structure.

b. In page 6 of the remarks applicant stated that Radjai does not teach or suggest "shifting the small pieces to a periphery of a cylindrical tube or container by alternating a magnetic field using an electromagnetic coil disposed such that the electromagnetic coil envelops the metallic material to yield the refined microstructure of the metallic material concentrated in the periphery of the cylindrical tube or container" as claimed in claim 15. However, it is noted that Radjai discloses a grain refinement method for aluminum alloy by applying an electric current and a magnetic field simultaneously to the molten aluminum alloy during a solidification process. Thus, it is expected that the cast structure of Radjai will be the same as that of instant process. Although he does not mention the feature of shifting a refined material to a periphery of a container to yield the refined material concentrated in an end portion of the metallic material,

apparently, his process will produce the same result as that of applicants since he performs the identical process steps as that of applicants, i.e. if there is a function of alternating a magnetic field using an electromagnetic coil in applicant's process, it will have a same function in the process of Radjai. Without showing any evidence that the small pieces of Radjai are not shifted to a periphery of a container to yield said refined microstructure of the metallic material concentrated in the periphery of the container, applicant's argument is not deemed to be persuasive.

c. In page 6 of the remarks applicant further stated that Radjai reduces the silicon particle size by vibrations at temperature *higher* than a liquidus and does not apply an electric current and a magnetic field simultaneous to the *solidifying* metallic material. However, it is noted that Radjai also states that the silicon particles are agglomerated and repelled to the outer surface after the start of the solidification. Thus, it is apparent that the Radjai does teach to apply two fields at the temperature *above and below* the liquidus temperature.

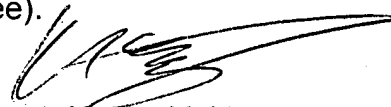
d. Further, even if Radjai does not teach to apply two fields at the temperature lower than the liquidus, Vives does teach to develop a cavitation in molten material at a temperature *lower* than the liquidus for crushing metallic particle into small pieces, it would have been obvious to continue apply the electric current and the magnetic field simultaneous to the *solidifying* metallic material to better refine the casting structure of Radjai in view of Vives.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kuang Y. Lin whose telephone number is 571-272-1179.

The examiner can normally be reached on Monday-Friday, 10:00-6:30,.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas X Dunn can be reached on 571-272-1171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kuang Y. Lin
Primary Examiner
Art Unit 1725

12-16-04